REMARKS

Claims 1-17 are pending in this application. By this Amendment, claim 1 is amended. No new matter is added. Reconsideration of the application based on the above amendments and the following remarks is respectfully requested.

Entry of the amendments is proper under 37 CFR §1.116 because the amendments: (a) place the application in condition for allowance for the reasons discussed below; (b) do not raise any new issue requiring further search and/or consideration as the amendments amplify issues previously discussed throughout prosecution; and (c) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made in response to arguments raised in the final rejection. Entry of the amendments is thus respectfully requested.

The Office Action, on page 2, rejects claim 1 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,353,291 to Sprangle et al. (hereinafter "Sprangle") in view of "Generation of 0.1-TW optical pulses with single stage Ti: sapphire amplifier at a 1-kHz repetition rate," Appl. Phys. B 70[Suppl.] S161-S164 2000 by Hentschel et al. (hereinafter "Hentschel"). This rejection is respectfully traversed.

The Office Action asserts that Sprangle teaches many of the features recited in the pending claims. At the outset, Applicants note that, without further explanation, the Office Action asserts that because "repetition rates greater than 50 kHz," was recited in the preamble it is not give patentable weight. It should be noted that patentable weight may be given to features recited in the preamble that give life and meaning to the rest of the claim. As such, a blanket dismissal of the features recited in the preamble is improper. That being stated, however, Applicants amend claim 1 to clarify the features recited in that claim by ensuring that at least this patentable distinction is incorporated into the body of the claim.

In its analysis of the Sprangle reference, the Office Action errs in stating that it would have been obvious to adjust the repetition rate to obtain various outputs. Although it is possible to adjust the repetition rate, the range of operating rates is limited by the design of the laser. As such, those of ordinary skill in the art understand that it is not possible to arbitrarily change parameters like repetition rate or energy output without adapting the overall design of the laser system where parameters are chosen that are outside of a particular design range. In other words, operating parameters such as, for example, repetition rates greater than 50 kHz define certain structural parameters of the affected system that cannot be simply dismissed as appears to have been done in the Office Action.

Further, in assessing the applicability of the Sprangle reference, the Office Action misreads that reference for what it would teach one of ordinary skill in the art when considered "as a whole," as is necessary in making an obviousness rejection. The Office Action cites element 42, shown in Fig. 1 of Sprangle as a "recycler or low gain amplifier," as allegedly corresponding to the regenerative amplifier recited in the pending claims. This analysis fails for at least the following reasons. This elemental component of Sprangle forms part of the disclosed synchrotron source that is the Sprangle apparatus. By contrast, claim 1 is directed to a laser system according to the principle of a regenerative amplifier. In this manner, the laser resonator recited in claim 1 forms a portion of the regenerative amplifier set up rather than the other way around. For at least this reason the Office Action's reliance on one or more components belonging to a laser synchrotron source as comprising the regenerative amplifier set up recited in the pending claims is in error.

The above conclusion is supported in this case when the Sprangle reference is read in its entirety. Element 42 is discussed briefly at col. 4, lines 1-9. Although there is the mention of a beam being stretched amplified and recompressed, there is no disclosure in Sprangle regarding where or how the stretching or compressing of pulses occurs. As such, it is

improper to assert that there is, for example, a specifically designed pulse stretcher as a component inside any cavity in the Sprangle device. Finally, there is no specific repetition rate for the alleged regenerative amplifier disclosed in Sprangle either explicitly or implicitly.

The Office Action concedes Sprangle fails to disclose certain of the features recited in the pending claims. Specifically, the Office Action, on page 3, indicates that Sprangle fails to disclose a pulse stretcher, inside a cavity of the resonator, as a specially designed component, the pulse stretcher having at least one of a structure-or material-related dispersive effect, and the pulse stretcher having minimum 3rd order dispersion with maximum 2nd order dispersion. Rather, the Office Action relies upon Hentschel as making up for these specific shortfalls in the application of Sprangle to the subject matter of the pending claims. This analysis of the Office Action fails for at least the following reasons.

Hentschel uses an "extra-cavity" pulse shaping setup with a long stretcher component (see Fig. 3 and the discussion on page 162). Specifically, Hentschel teaches "[d]ue to this broad bandwidth, the material dispersion of a 10-cm-long SF57 glass block and the Faraday isolator at the entrance of the amplifier is sufficient to stretch the pulses up to [approximately] 20 ps." Hentschel goes onto describe that "[t]his grating-less stretching technique provides high efficiency and no need for alignment. After temporal shaping, the pulse train is injected into a multi pass amplifier arrangement." There is no manner by which any alleged pulse stretcher disclosed by Hentschel is located inside the cavity.

Further, for external-cavity components, such as those described in Hentschel, the restrictions of intra-cavity placement are not present. Such designs allow for simple use of bulky parts. Specific shortfalls regarding arrangements of this type are discussed in Applicants' disclosure at least on page 2, lines 1-12. Specifically, Applicants' disclosure discusses that "[l]aser devices to date, and particularly those with regenerative amplifiers or with chirped pulse regenerative amplification (CPA) achieve the necessary energy but are

often limited by the size of the required pulse stretcher/compressor unit." Applicants' disclosure goes on to explain that "external components especially in the pulse stretcher, result in a greater complexity and increased effort for the adjustment." Based on these positive disclosures on Applicants' part, it is clear that it is not the simple substitution of external pulse structure components such as those disclosed in Hentschel that can be applied to achieve the specific features recited in the pending claims.

Additionally, as is discussed above regarding the modification of repetition rates, it should be noted that Hentschel is designed for repetition rates of approximately of 1 kHz, well below the at least 50 kHz recited in the pending claims. Prior art devices, such as those described in Hentschel, are not designed for high repetition rates.

In order to achieve the high performance desired by the subject matter of the pending claims, without damaging the amplification medium, it is necessary to temporarily stretch pulses leading to a reduced intensity. The pulse length and the amount of stretching depend on the laser medium and the desired output power. For low pulse energies, a pulse stretcher can be avoided if the dispersive contributions of the generic components of a regenerative amplifier, like Pockels-cells, quarter-wave plates, or laser media, are sufficient for stretching. However, in the desired parameter range set forth in the pending claims, a separate pulse stretcher, with a specific stretcher component, is required.

In the prior art, such as in Hentschel, any such stretching was only externally achievable. The integration of a pulse stretcher into the cavity is not shown in the prior art, particularly, as being coupled with the desired repetition rate, as well as a specific damage threshold for the laser media and pulse energy. This selection of components based on their properties and interdependencies is discussed in Applicants' specification at least at page 7, line 20 and below, with specific examples discussed on pages 10-14. As such, and specifically based on the reliance of the Office Action on Hentschel for what it can reasonably

be considered to have suggested with respect to the subject matter of the pending claims, it should be noted that Hentschel neither teaches to incorporate a pulse stretcher component into a cavity, nor does Hentschel provide any necessary details and parameters that would lead to any suggestion of such integration.

For at least the foregoing reasons, Sprangle and Hentschel are not combinable in the manner suggested. Further, the combination of Sprangle and Hentschel cannot reasonably be considered to have suggested the combination of all of the features recited claim 1.

Accordingly, reconsideration and withdrawal of the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Sprangle in view of Hentschel are respectfully requested.

The Office Action, on page 3, rejects claims 1-4, 6-12 and 14-17 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0149836 to Jovanovic et al. (hereinafter "Jovanovic") in view of Hentschel. The Office Action, on page 7, rejects claims 5 and 13 under 35 U.S.C. §103(a) as being unpatentable over Jovanovic in view of Hentschel, and further in view of U.S. Patent Application Publication No. 2003/0095320 to Pang. These rejections are respectfully traversed.

In addition to the discussion above with respect to the combination of Sprangle and Hentschel, the Office Action's application of Jovanovic is also in error for several reasons.

First, Jovanovic neither teaches a regenerative amplifier set up or discloses a pulse stretcher inside a cavity of the resonator. Fig. 2 of Jovanovic is instructive in illustrating the set up of a pulse stretcher specifically located outside the cavity of the resonator 302. The Office Action's attempt to interpret oscillator 302 and mirror 313 as forming a laser resonator is not supported by the description of Fig. 2. In fact, the discussion regarding Fig. 2 of Jovanovic actually discusses the replacement of a regenerative amplifier (see paragraph [0029]). This paragraph specifically rebuts the application of the Jovanovic reference to the

subject matter of the pending claims. Paragraph [0029] begins by stating "[i]n the example shown in Fig. 2, an experimental OPCPA set up 300 is illustrated for replacing Ti:sapphire-regenerative amplifiers." Paragraph [0029] goes on to describe a "mode-locked Ti:sapphire-oscillator" and use of a single pulse "selected from the oscillator pulse train using a Pockels-cell 305." The discussion in this paragraph, and the paragraph following ([0030]) is directed to a pulse being generated in the Ti:sapphire oscillator and picked by the operation of the Pockels-cell thereby alleviating the resonator or oscillator 302. The Pockels-cell acts as a switch and separates the pulse generating component from the pulse using part of the setup. Subsequently, the pulse is stretched outside the cavity and then imaged to the OPA.

In other words, Jovanovic teaches to replace regenerative amplifiers, and fails to show a pulse stretcher inside a cavity. For at least these reasons, the Jovanovic reference provides no suitable technical basis by which to assert that any of the features recited in the pending claims are even suggested by this reference. Further, and for the reasons described above, the combination of Jovanovic with Hentschel, even if they were combinable in the manner suggested by the Office Action, does not provide any basis to find that this combination of references would reasonably have suggested the combinations of all of the features positively recited in independent claim 1.

For at least the reasons discussed above with Sprangle, Jovanovic and Hentschel are not combinable in the manner suggested. Further, the combination of Jovanovic and Hentschel cannot reasonably be considered to have suggested the combination of all of the features recited claim 1. Further, and because Pang is not applied in any manner that would overcome the above-identified shortfalls in the application of the combination of Jovanovic and Hentschel to the subject matter of claim 1, the asserted combinations of applied references cannot reasonably be considered to have suggested the combinations of all of the

features recited claims 2-17 for at least the dependence of these claims on an allowable base claim, as well as for the separately patentable subject matter that each of these claims recites.

Accordingly, reconsideration and withdrawal of the rejection of claims 1-17 under 35 U.S.C. §103(a) as being unpatentable over the applied references are respectfully requested.

In view of the foregoing, Applicants respectfully submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-17 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

James A. Oliff
Registration No. 27,075

Thomas J. Pardini
Registration No. 30,411

JAO:DAT/cfr

Date: June 17, 2009

OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

DEPOSIT ACCOUNT USE AUTHORIZATION
Please grant any extension necessary for entry;
Charge any fee due to our Deposit Account No. 15-0461